

INCOME SHARES REVISITED

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A number of recent studies claim that when properly computed, factor income shares across countries at different levels of development are essentially uniform. This note evaluates the methodology behind such findings and offers estimates using newly available data. The results for a group of 55 developed, developing, and transition economies for the period 1990–2008 lead us to reject the hypothesis of factor share convergence.

JEL Codes: E25, O10

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1. INTRODUCTION

A number of recent studies led by influential papers by Gollin (1998, 2002) and Bernanke and Gurkaynak (2001) claimed that factor shares do not depend upon the level of development. Since the publication of these papers, their methods and results were used or quoted approvingly in the growth and development literature.¹ For example, such results were instrumental in recent claims of global convergence of returns to capital (Caselli and Feyrer, 2007; Mello, 2009).

It appears, however, that the conclusion about unification of factor shares across countries rests on specific assumptions about one important unobserved variable—labor income of unincorporated enterprises (UE). The role of these enterprises, mostly small family businesses, is relatively insignificant in developed countries, but is quite large in developing countries, where they produce up to 50 percent of GDP and employ up to 70 percent of the labor force (Figure 1). The principal problem in comparing income shares is that UE wages and profits are not reported as separate items by national and international statistics.

2. MEASURING THE “INVISIBLE VARIABLE”

To overcome this problem, existing studies allocate UE output between labor and capital using one of the three methods: (i) splitting UE by a fixed arbitrary

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¹In spite of its importance in economics, there is no uniform methodology for measuring factor shares. Actual estimates, particularly for cross-country studies, vary significantly. Many studies assume uniform factor shares across countries—usually a split of two-thirds labor and one-third capital.

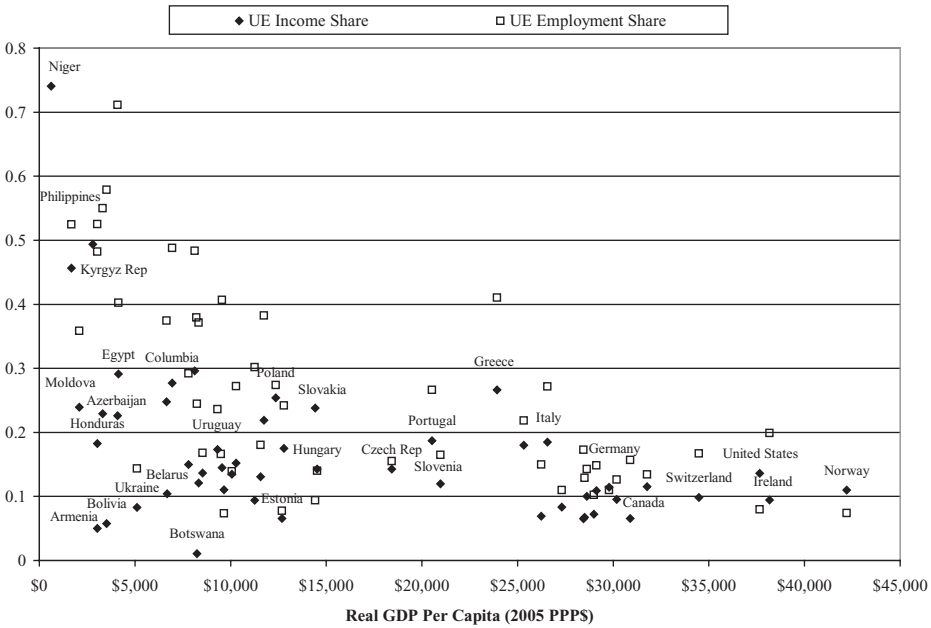


Figure 1. Shares of Employment and Output Generated by Private Unincorporated Enterprises, 1990–2008

Source: Authors’ computations are based on the United Nations System of National Accounts (United Nations, 2012), World Bank Development Indicators (World Bank, 2012), and ILO LABORSTA (ILO, 2011).

proportion; (ii) imputing to UE workers a certain average wage, usually based on corporate-sector compensation; and (iii) assuming that the UE factor shares are the same as in the corporate sector.

All of the above methods are used in cross-country studies of factor income shares (typically labor shares), many of which rely on national income data from the United Nations National Accounts Statistics (UNNAS) database (Gollin, 1998, 2002; Bernanke and Gurkaynak, 2001; Jayadev, 2007). The advantage of the UNNAS database is that, unlike other statistical sources used in cross-country studies such as the Penn World Tables and the World Bank’s World Development Indicators, the UNNAS database provides the breakdown of national income by source of income.²

In the UNNAS database, a country’s GDP is divided into four components:

- compensation of employees in corporate and government-owned enterprises ($COMP_{CG}$),
- gross operating surplus (gross profits) of these enterprises (GOS_{CG}),
- gross mixed income (output) of private unincorporated enterprises, including self-employed (GMI_{UE}), and
- indirect taxes corrected for subsidies (T_{ind}):

²For a detailed description, see Appendix.

$$(1) \quad Y = COMP_{CG} + GOS_{CG} + GMI_{UE} + T_{ind}$$

Based on this method one labor share in the country's GDP is estimated as follows:

$$(2) \quad S_L = (COMP_{CG} + \lambda GMI_{UE}) / (Y - T_{ind})$$

Here S_L is the labor share of GDP, λ is the labor-income share in mixed sector output ($0 \leq \lambda \leq 1$), and other variables are as defined in (1). GDP is reduced by the amount of indirect taxes net of subsidies so that output is measured at cost.

Most studies using this method assume the value of λ to be equal to 2/3. However some authors split mixed income 50:50 while others assign all of it to labor or to capital (Poterba, 1998; Krueger, 1999; Jayadev, 2007; Atkinson, 2009).

Based on imputed wage method labor share is computed as:

$$(3) \quad S_L = (COMP_{CG} + \beta w_{CG} L_{UE}) / (Y - T_{ind})$$

Here w_{CG} is average compensation in the CG sector, β is a ratio of average UE compensation to average compensation in CG sector, ($0 < \beta < 1$), and L_{UE} is employment in the UE sector (Young, 1995; Ellis and Smith, 2010).

The third estimation method introduced by Gollin (1998, 2002) and developed by Bernanke and Gurkaynak (2001) is a variation of method one. However instead of using a fixed proportion of labor income in UE output for all countries, it assumes it to vary similarly to labor's share in the corporate and government sector of each country. Using the "variable-ratio" assumption the economy-wide labor share is estimated as follows:

$$(4) \quad S_L = COMP_{CG} / (Y - GMI_{UE} - T_{ind})$$

All variables are defined as above. See Gollin (2002, p. 468) and Bernanke and Gurkaynak (2001, p. 23).

Each of these three methods has weaknesses. The fixed-ratio assumption is convenient for computations but arbitrary and does not account for differences between countries. The variable-ratio approach effectively equates value-added structure of non-corporate and corporate enterprises which has no clear theoretical justification. However, compared to the fixed-ratio approach it has an advantage of providing a country-specific anchor for the choice of UE income proportions.

The strongest arguments can be made against the imputed wage method. Compared to UE enterprises, corporations typically have higher levels of capital and technology, ensuring *higher* productivity and wages. In poorer countries the corporate compensation premium is larger than in the rich ones, which can be seen by comparing average wages in the corporate sector and GDP per capita. While in poor countries, average corporate wages reach 200–300 percent of GDP per capita, in richer ones it fluctuates between 100 and 150 percent.³ Thus international

³Data are authors' computations based on the United Nations System of National Accounts (United Nations, 2012), World Bank Development Indicators (World Bank, 2012), and ILO LABORSTA (ILO, 2011).

comparison of labor shares using the imputed-wage method would always inflate labor income shares in poor countries.⁴

3. NEW DATA AND ESTIMATES OF LABOR SHARES

Table 1 presents estimates of labor shares for 55 developed, developing, and transition economies for which necessary data were reported to the UNNAS, and reproduces the Bernanke and Gurkaynak (2001) results for comparison. The first estimate uses fixed-ratio approach with UE output split between labor and capital at 2:1 ratio. The second is based on the imputed-wage method with average compensation in UE set equal to average corporate-sector compensation. The third estimate uses the variable-ratio method. The Bernanke and Gurkaynak (2001) results, also based on the variable-ratio method, are presented in the last column.

Table 2 and Figure 2 present the results of statistical tests of association between four measures of labor share (it includes an additional measure, where UE output is split equally between labor and capital) and level of development measured by GDP per capita. A positive link exists for all but the least credible of labor share measures—the one based on the imputed wage assumption. The regression results for the three statistically-significant relationships in Table 2 suggest that an increase in real GDP (in 2005 PPP \$) of \$10,000 is associated with a labor share increase of between 3 and 4 percentage points. Based on this, a country in the middle of development distribution—with the GDP per capita of about \$11,000 in 2008—will have labor share that is 10–15 percentage points below that of a typical OECD country. Our results contradict the factor income share conversion hypothesis, at least for the recent period, and support similar factor share patterns found in earlier data (Elias, 1992; Rodrik, 1999).

4. DISCUSSION

The main reasons for differences in our results and those of the Gollin (1998, 2002) and Bernanke and Gurkaynak (2001) papers are explained by differences in the sample of countries and periods covered. In the original Gollin (1998, 2002) papers, labor shares were computed for 41 countries that provided UE output data for at least one year during the 1988–92 period. The Bernanke and Gurkaynak (2001) study expanded Gollin's sample reporting average labor shares for 53 countries for the period 1980–95 (see Table 1). The increase in sample size was achieved by assuming that in countries lacking UE output data, UE workers had the same productivity and the same wage as their corporate peers (Bernanke and Gurkaynak, 2001, p. 24). This assumption was required for more than half of their sample. As discussed earlier, this assumption is not accurate as it overstates UE labor shares in poorer countries. Our dataset, in contrast, includes only countries that directly reported their UE output. It also covers a more recent period and

⁴For this reason in some developing countries *total* labor shares based upon this methodology can exceed 100 percent of GDP (see Table 1).

TABLE 1
 LABOR SHARE MEASURES BASED ON DIFFERENT ASSUMPTIONS FOR LABOR INCOME EARNED IN
 PRIVATE UNINCORPORATED ENTERPRISES, 1990–2008, AND RESULTS FROM BERNANKE AND
 GURKAYNAK, 1980–95

| | UE Output is Split between Labor and Capital at 2:1 Ratio | Average Compensation in UE is Assumed to be the Same as in CG | Labor Share in UE Output is Assumed to be the Same as in the CG | Bernanke and Gurkaynak |
|------------------|--|--|--|------------------------------|
| Argentina | 0.463 | 0.490 | 0.428 | |
| Armenia | 0.474 | 0.731 | 0.465 | |
| Australia | 0.623 | 0.647 | 0.617 | 0.68 |
| Austria | 0.641 | 0.653 | 0.637 | 0.71 |
| Azerbaijan | 0.401 | 0.382 | 0.306 | |
| Belarus | 0.574 | | 0.563 | |
| Belgium | 0.641 | 0.664 | 0.638 | 0.73 |
| Bolivia | 0.410 | 1.169 | 0.400 | 0.67 |
| Botswana | 0.288 | 0.368 | 0.283 | |
| Brazil | 0.479 | 0.619 | 0.468 | 0.45 |
| Bulgaria | 0.479 | 0.467 | 0.451 | |
| Canada | 0.603 | 0.666 | 0.598 | 0.68 |
| Chile | 0.482 | 0.605 | 0.464 | 0.59 |
| Columbia | 0.534 | 0.644 | 0.486 | 0.65 |
| Croatia | 0.614 | 0.697 | 0.610 | |
| Cyprus | 0.554 | 0.560 | 0.540 | |
| Czech Rep | 0.564 | 0.572 | 0.551 | |
| Egypt | 0.513 | 0.517 | 0.446 | 0.77 |
| Estonia | 0.576 | 0.581 | 0.570 | |
| Finland | 0.622 | 0.677 | 0.618 | 0.71 |
| France | 0.632 | 0.651 | 0.628 | 0.71 |
| Georgia | 0.461 | 0.639 | 0.369 | |
| Germany | 0.659 | 0.652 | 0.657 | 0.69 |
| Greece | 0.471 | 0.607 | 0.447 | 0.79 |
| Guatemala | 0.498 | 1.221 | 0.448 | |
| Honduras | 0.607 | 1.025 | 0.594 | |
| Hungary | 0.629 | 0.618 | 0.623 | |
| Iran | 0.442 | 0.447 | 0.344 | |
| Ireland | 0.519 | 0.551 | 0.503 | 0.73 |
| Italy | 0.583 | 0.626 | 0.564 | 0.65 |
| Japan | 0.574 | 0.647 | 0.568 | 0.73 |
| Kazakhstan | 0.542 | 0.573 | 0.506 | |
| Kyrgyz Rep | 0.656 | 0.609 | 0.646 | |
| Latvia | 0.576 | 0.562 | 0.563 | |
| Lithuania | 0.540 | 0.561 | 0.520 | |
| Luxembourg | 0.609 | | 0.601 | |
| Mexico | 0.474 | 0.530 | 0.422 | 0.55 |
| Moldova | 0.578 | 0.714 | 0.568 | |
| Mongolia | 0.518 | 0.626 | 0.430 | |
| Netherlands | 0.615 | 0.643 | 0.613 | 0.66 |
| Niger | 0.605 | | 0.473 | |
| Norway | 0.589 | 0.553 | 0.582 | 0.61 |
| Panama | 0.466 | 0.565 | 0.434 | 0.73 |
| Philippines | 0.477 | | 0.570 | 0.59 |
| Poland | 0.610 | 0.613 | 0.593 | |
| Portugal | 0.659 | 0.736 | 0.657 | 0.71 |
| Romania | | 0.698 | | |
| Russian Fed | 0.581 | 0.543 | 0.570 | |
| Serbia | 0.657 | 0.777 | 0.655 | |
| Slovakia | 0.597 | 0.483 | 0.574 | |
| Slovenia | 0.673 | 0.711 | 0.674 | |
| South Africa | | 0.576 | | 0.62 |
| Spain | 0.653 | 0.671 | 0.649 | 0.67 |
| Sweden | 0.669 | 0.652 | 0.669 | 0.74 |
| Switzerland | 0.695 | 0.778 | 0.699 | 0.76 |
| Tajikistan | 0.485 | | 0.339 | |
| Ukraine | 0.577 | 0.617 | 0.566 | |
| United Kingdom | 0.648 | 0.691 | 0.646 | 0.72 |
| United States | 0.705 | 0.668 | 0.711 | 0.71 |
| Uruguay | 0.540 | 0.467 | 0.514 | 0.58 |
| Venezuela | 0.402 | | 0.380 | 0.53 |
| Mean labor share | 0.559 | 0.637 | 0.537 | |
| S.D. | 0.086 | 0.151 | 0.104 | |

Source: Authors' computations are based on the United Nations System of National Accounts (United Nations, 2012), World Bank Development Indicators (World Bank, 2012), and ILO LABORSTA (ILO, 2011), and Bernanke and Gurkaynak (2001) for matching countries.

TABLE 2
LABOR SHARES BASED ON DIFFERENT ASSUMPTIONS FOR LABOR INCOME IN UNINCORPORATED ENTERPRISES

| | UE Output is Split between labor and Capital at 2:1 Ratio | UE Output is Split between Labor and Capital at 1:1 Ratio | Average <i>compensation</i> in UE is Assumed to be the Same as in CG | Labor <i>Share</i> in UE Output is Assumed the Same as in the CG |
|-----------------------------|---|---|--|--|
| Real GDP per capita (000\$) | 0.003*** | 0.004*** | -0.001 | 0.004*** |
| S.E. | 0.001 | 0.001 | 0.001 | 0.001 |
| Confidence Interval | 0.002 to 0.005 | 0.002 to 0.005 | -0.005 to 0.003 | 0.003 to 0.006 |
| R ² | 0.255 | 0.337 | 0.005 | 0.303 |
| N | 59 | 58 | 54 | 59 |

*** Significant at 99%.

Source: Authors' computations are based on the United Nations System of National Accounts (United Nations, 2012) and ILO LABORSTA (ILO, 2011), and World Bank Development Indicators, 2012, per capita GDP in \$2005PPP.

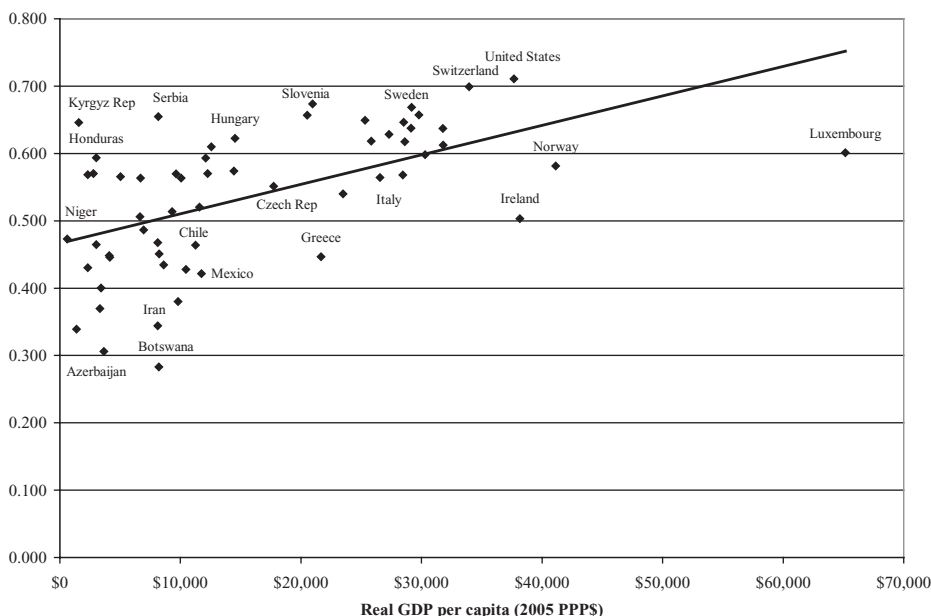


Figure 2. Labor Shares and GDP Per Capita in 55 Countries, 1990–2008

Note: Labor shares in UE output assumed to equal those in CG sector.

Source: Authors' computations are based on the United Nations System of National Accounts (United Nations, 2012), World Bank Development Indicators (World Bank, 2012), and ILO LABORSTA (ILO, 2011).

includes a significant number (18) of post-communist transition economies, such as Russia and Poland, not covered in the Gollin (1998, 2002) and Bernanke and Gurkaynak (2001) studies.

Our results indicate that labor shares in rich countries are generally higher and capital shares lower than in poor countries and thus call into question findings of studies based on the factor-share equalization hypothesis. This includes an influential paper by Caselli and Feyrer (2007) that used Bernanke and Gurkaynak (2001) data in a cross-country study of the macroeconomic rates of return on capital. Starting with capital shares that are approximately equal across countries contributes to the main finding of Caselli and Feyrer (2007)—the equalization of rates of return across developed and developing countries.⁵

The existence of significant and systematic differences in factor income shares requires revisiting the assumption of factor-share constancy across both space and

⁵In their computations of rates of return, Caselli and Feyrer (2007) adjust capital shares by excluding income imputed to non-reproducible (natural) capital. This lowers the capital shares in all countries but more significantly for poorer ones where land and natural resources are relatively more abundant. Throughout their analysis, however, Caselli and Feyrer (2007) do not question the fact that income from *both* reproducible and natural parts of capital accrue to the owners of capital. Therefore their adjustment does not affect the *total* share of capital, much like the theoretical division of labor income into parts accruing to human capital and “raw labor” does not affect the *total* labor share (Poterba, 1998). We fully agree, however, that the internal composition of capital and labor shares is an important issue, deserving a separate investigation.

time often made in studies of economic growth and development. Our results directly contradict the *space* dimension of this assumption. Investigation of its *time* dimension is outside the scope of our paper. However, the large literature on this topic is close to a consensus regarding the existence of the long-term trends in factor shares. Specifically most studies agree that labor shares in the developed countries were growing between the 1950s and early 1980s, during the period of the so-called “profit squeeze” (Nordhaus, 1974; Feldstein and Summers, 1977; Sachs, 1979; Weisskopf, 1979) but have been falling from the 1980s to the 2000s (Bentolila and Saint-Paul, 2003; Mohun, 2006; Atkinson, 2009; Bental and Demougin, 2009; Stockhammer *et al.*, 2009; Ellis and Smith, 2010; Kristal, 2010; Azamat *et al.*, 2012).⁶ Combining these results with the persistence of cross-country differences in factor shares leads one to reject the uniform-factor-share hypothesis, at least for the recent period.

4. CONCLUSIONS

Since Ricardo and Marx, the “true value” of factor shares in national income has been one of the most contested issues in economics. A number of recent papers have argued that factor income shares are essentially equalized across countries at different development levels. Our estimates do not support the factor income share convergence hypothesis. Labor shares in poorer countries continue to be persistently and significantly lower than in the rich ones. Taken together with the large literature documenting the long-term trends in factor shares in the last 50–60 years, our results call into question the assumption of time and space uniformity of factor shares often made in growth studies.

APPENDIX

Definitions of variables as provided in the United Nations National Accounts Statistics database are as follows.

Gross Operating Surplus: The operating surplus measures the surplus or deficit accruing from production before taking account of any interest, rent or similar charges payable on financial or tangible non-produced assets borrowed or rented by the enterprise, or any interest, rent or similar receipts receivable on financial or tangible non-produced assets owned by the enterprise (note: for unincorporated enterprises owned by households, this component is called “mixed income”).

Compensation of Employees: Compensation of employees is the total remuneration, in cash or in kind, payable by an enterprise to an employee in return for work done by the latter during the accounting period: total remuneration - in cash or in kind - paid by an enterprise to an employee in return for work done during the accounting period.

⁶Competing explanations behind the recent “labor share squeeze” include capital deepening, IT-led technical change, globalization of capital and labor markets, and a decline in labor’s bargaining power. A few papers that investigated trends in factor shares in developing and transition economy countries report that labor shares in most of them also decreased in the 1990s and 2000s (Izyumov and Claxon, 2009; Bai *et al.*, 2010; Marquetti *et al.*, 2010).

Mixed Income: Mixed income is the surplus or deficit accruing from production by unincorporated enterprises owned by households.

Gross Domestic Product: Income Based: Income-based gross domestic product is compensation of employees, plus taxes less subsidies on production and imports, plus gross mixed income, plus gross operating surplus.

Source: United Nations National Accounts Statistics database, available at <http://unstats.un.org/unsd/databases.htm>, 2012.

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